

Notice of Allowability

Application No.

09/747,054

Examiner

Tony Mahmoudi

Applicant(s)

BULKA ET AL.

Art Unit

2165

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the amendment filed on 21-September-2004.
2. ☒ The allowed claim(s) is/are 4 and 14-18, re-numbered as claims 1-6.
3. ☒ The drawings filed on 22 December 2000 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date 20050414.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____


CHARLES RONES
PRIMARY EXAMINER

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DETAILED ACTION

Remarks

1. In response to the amendment filed on 21-September-2004, claims 4 and 14-18 have been amended per applicant's request.
2. In view of the examiner's amendment, authorized by the Attorney of Record, all claims have been amended by the examiner (details provided below.) Claims 4 and 14-18 are presently pending in the application.

Examiner's Amendment

3. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. A. Jose Cortina (Attorney of Record) on 14-April-2005 (see enclosed Interview Summary, paper No. 20050414, for details.)

The claims have been amended by the examiner as follows. This listing of claims will replace all prior versions, and listings of claims in the Application:

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1-3 (Canceled).

4. (Currently Amended) A method of accessing files in a file access system, comprising:

establishing a field in a directory i-node memory structure for files corresponding to a directory cache hash table, said field containing a pointer to said directory cache hash table;

reading a directory into buffer cache, the directory having a storage device representation with each entry in the a list of files containing a link to a corresponding offset where filenames are stored in memory;

converting the directory from the storage device representation to a ~~faster~~ another representation, ~~the faster representation~~ representing a layout of the directory with an array of hash buckets which point to a list of files which ~~may~~ correspond to a specific i-node with each i-node having a field corresponding to the directory cache hash table;

searching ~~the faster~~ said another representation for a requested file by hashing the file i-node to a specific bucket which contains a list of files that ~~may~~ correspond to the requested file I-node;

if the offset contains a matching filename, completing the search, and if the filename is not found, checking the next entries sequentially until the filename is one of found and not found; and

wherein the storage device representation is maintained for backwards compatibility with pre-existing and older file access systems.

5-13 (Canceled).

14. (Currently Amended) A computer server system, comprising:

an outer cabinet housing memory, an array of storage devices, at least one power supply providing electrical power to the computer server system; and

at least one processor allocating memory for buffer cache and directory cache, with each entry in ~~the~~ a list of files containing a link to a corresponding offset where filenames are stored in memory, the processor converting directories from a storage device layout to a ~~faster~~ another representation which includes an array of hash buckets which point to a list of files which ~~may~~ correspond to a specific i-node, with each i-node having a field corresponding to a directory cache hash table, ~~the faster~~ said another representation including a pointer from a directory i-node memory structure to an associated hash table.

15. (Currently Amended) A network storage system, comprising:

an outer cabinet housing memory, an array of storage devices, at least one power supply providing electrical power to the computer server system, and

at least one processor allocating memory for buffer cache and directory cache, with each entry in ~~the~~ a list of files containing a link to a corresponding offset where filenames are stored in memory, the processor converting directories from a storage device layout to a ~~faster~~ another representation which includes an array of hash buckets which point to a list of files which ~~may~~ correspond to a specific i-node, ~~the faster~~ said another representation including a field in each i-node corresponding to a directory cache hash table and a pointer from a directory i-node memory structure to an associated hash table.

16. (Currently Amended) A method of searching a file access system for a requested file, comprising:

establishing a field in a directory i-node memory structure for files corresponding to a directory cache hash table, with each entry in ~~the~~ a list of files containing a link to a corresponding offset where filenames are stored in memory, and said field containing a pointer to said directory cache hash table;

allocating memory for a directory cache and buffer cache hash table having an array of hash buckets which point to a list of files which ~~may~~ correspond to a specific i-node, the directory cache hash table storing directory layouts, and the step of allocating memory for the directory cache hash table including selecting directories to cache using at least one of ~~the~~ a number of files in a directory and ~~the~~ a frequency of use;

searching the directory cache hash table for a requested file by hashing the file i-node to a specific bucket which contains a list of files that ~~may~~ correspond to the requested file i-node, and if the filename in the directory cache hash table is not found, conventionally searching file structures; and

if the offset in the bucket contains a matching filename, pointing to where the name of the requested file is stored, to complete the search, and if the filename is not found checking the next entries sequentially until the filename is one of found and not found.

17. (Currently Amended) A method of accessing files in a file access system, comprising:

establishing a field in a directory i-node memory structure for files corresponding to a directory cache hash table, said field containing a pointer to said directory cache hash table;

reading a directory into buffer cache, with each entry in ~~the~~ a list of files containing a link to a corresponding offset where filenames are stored in memory, and the directory having a storage device representation;

converting the directory to a ~~faster~~ another representation, ~~the faster representation~~ including which includes a pointer from the directory i-node to an associated hash table, the hash table containing a layout of the directory with an array of hash buckets which point to a list of files which ~~may~~ correspond to a specific i-node;

hashing selected directories into a hash table format according to at least one of a size of the directory, frequency of access, and a user selected criteria;

searching ~~the faster~~ said another representation for a requested file;

if the offset contains a matching filename, completing the search, and if the filename is not found, checking the next entries sequentially until the filename is one of found and not found; and

wherein the storage device representation is maintained for backwards compatibility with pre-existing file access systems.

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18. (Currently Amended) A method of searching a file access system (see Abstract) for a requested file, comprising:

establishing a field in a directory i-node memory structure for files corresponding to a directory cache hash table, said field containing a pointer to said directory cache hash table;

allocating a hash table, the hash table having hash buckets which point to a list of files which may correspond to a specific i-node;

hashing a directory into the hash table, said hashing a directory including hashing selected directories into a hash table format according to at least one of a size of the directory and frequency of access, and with each entry in the a list of files containing a link to a corresponding offset where filenames are stored in memory;

linking hash buckets to offsets where a name of the requested file is stored;

establishing a pointer for the directory, the pointer pointing from a directory i-node to the hash table;

searching the hash buckets for a requested file; and

if the offset contains a matching filename, completing the search, and if the filename is not found, checking the next entries sequentially until the filename is one of found and not found.

Allowance

4. Claims 4 and 14-18 are allowed over the prior art made of record.

5. The following is an examiner's statement of reasons for allowance:

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The applicant's amendment, filed on 21-September-2004 and the examiner's amendment, authorized by the attorney of record on 14-April-2005, overcome the cited prior art with respect to the independent claims 4 and 14-18:

The prior art of record, Johnson et al (U.S. patent No. 5,151,989), Saks et al (U.S. Patent No. 5,666,532) and Ish et al (U.S. patent No. 5,778,430), do not disclose, teach, or suggest the claimed limitations of (in combination with all other features in the claims):

- reading a directory into buffer cache, the directory having a storage device representation with each entry in a list of files containing a link to a corresponding offset where filenames are stored in memory;

- converting the directory from the storage device representation to another representation representing a layout of the directory with an array of hash buckets which point to a list of files which correspond to a specific i-node with each i-node having a field corresponding to the directory cache hash table;

- searching said another representation for a requested file by hashing the file i-node to a specific bucket which contains a list of files that correspond to the requested file I-node, as recited in independent claim 4.

- at least one processor allocating memory for buffer cache and directory cache, with each entry in a list of files containing a link to a corresponding offset where filenames are stored in memory, the processor converting directories from a storage device layout to another representation which includes an array of hash buckets which point to a list of files which correspond to a specific i-node, with each I-node having a field corresponding to a directory cache hash table, said another representation including a pointer from a directory i-node memory structure to an associated hash table, as recited in independent claim 14.

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at least one processor allocating memory for buffer cache and directory cache, with each entry in the a list of files containing a link to a corresponding offset where filenames are stored in memory, the processor converting directories from a storage device layout to another representation which includes an array of hash buckets which point to a list of files which may correspond to a specific i-node, said another representation including a field in each i-node corresponding to a directory cache hash table and a pointer from a directory i-node memory structure to an associated hash table, as recited in independent claim 15.

establishing a field in a directory i-node memory structure for files corresponding to a directory cache hash table, with each entry in a list of files containing a link to a corresponding offset where filenames are stored in memory, and said field containing a pointer to said directory cache hash table;

if the offset in the bucket contains a matching filename, pointing to where the name of the requested file is stored, to complete the search, and if the filename is not found checking the next entries sequentially until the filename is one of found and not found, as recited in independent claim 16.

reading a directory into buffer cache, with each entry in a list of files containing a link to a corresponding offset where filenames are stored in memory, and the directory having a storage device representation;

converting the directory to another representation which includes a pointer from the directory i-node to an associated hash table, the hash table containing a layout of the directory with an array of hash buckets which point to a list of files which correspond to a specific i-node;

if the offset contains a matching filename, completing the search, and if the filename is not found, checking the next entries sequentially until the filename is one of found and not found, as recited in independent claim 17.

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hashing a directory into the hash table, said hashing a directory including hashing selected directories into a hash table format according to at least one of a size of the directory and frequency of access, and with each entry in a list of files containing a link to a corresponding offset where filenames are stored in memory;

linking hash buckets to offsets where a name of the requested file is stored;

establishing a pointer for the directory, the pointer pointing from a directory i-node to the hash table;

searching the hash buckets for a requested file; and

if the offset contains a matching filename, completing the search, and if the filename is not found, checking the next entries sequentially until the filename is one of found and not found, as recited in independent claim 18.

Conclusion

6. Any inquiries concerning this communication or earlier communications from the examiner should be directed to Tony Mahmoudi whose telephone number is (571) 272-4078. The examiner can normally be reached on Mondays-Fridays from 08:00 am to 04:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dov Popovici, can be reached at (571) 272-4083.

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April 15, 2005


CHARLES RONES
PRIMARY EXAMINER